UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 9, 2010

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear LLC
P.O. Box 236
Hancock's Bridge, NJ 08038

SUBJECT: AUDIT REPORT REGARDING THE SALEM NUCLEAR GENERATING STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC NOS. ME1834 AND ME1836)

Dear Mr. Joyce

By letter dated August 18, 2009, Public Service Enterprise Group Nuclear, LLC, submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54) for renewal of Operating Licenses DPR-70 and DPR-75 for Salem Nuclear Generating Station, Units 1 and 2. On February 19, 2010, the U.S. Nuclear Regulatory Commission (NRC) audit team completed the onsite audit of aging management programs. The audit report is enclosed.

If you have any questions, please contact me by telephone at 301-415-2981 or by e-mail at Bennett.Brady@nrc.gov.

Sincerely,

Bennett M. Brady

Bennett M. Brady, Sr Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure:
As stated

cc w/encl: Distribution via Listserv

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OFFICE	LA:DLR	PM:DLR:RPB1	BC:DLR:RPB1	PM:DLR:RPB1
NAME	IKing	BBrady	BPham	BBrady
DATE	11/04/10	11/09/10	11/09/10	11/09/10

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Letter to Thomas Joyce from Bennett M. Brady dated November 9, 2010

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U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION – DIVISION OF LICENSE RENEWAL
AGING MANAGEMENT AUDIT REPORT

Docket Nos:	50-272 and 50-311
License Nos:	DPR-70 and DPR-75
Licensee:	Public Service Enterprise Group (PSEG) NUCLEAR LLC
Facility:	Salem Nuclear Generating Station, Units 1 and 2
Location:	Alloways Creek Road Hancocks Bridge, New Jersey 08038
Dates:	February 8–19, 2010
Reviewers:	D. Ashley, Sr. Project Manager, Division of License Renewal (DLR) D. Pelton, Branch Chief, DLR R. Auluck, Branch Chief, DLR D. Brittner, Reactor Engineer, DLR D. Nguyen, Electrical Engineer, DLR C. Doutt, Sr. Electrical Engineer, DLR R. Li, Electrical Engineer, DLR A. Sheik, Sr. Structural Engineer, DLR W. Holston, Mechanical Engineer, DLR M. Banic, Engineer, DLR P. Purtscher, Engineer, Division of Component Integrity (DCI) E. Murphy, Engineer, DCI J. Davis, Advanced Technologies and Laboratories (ATL) W. Pavanich, ATL R. Jackson, ATL E. Patel, ATL D. Naus, Oak Ridge National Laboratory (ORNL) J. Baker, ORNL B. Oland, ORNL K. Axler, Center for Nuclear Waste Regulatory Analysis (CNWRA) J. Mancillas, CNWRA R. Kazban, CNWRA

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David L. Pelton, Chief
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Office of Nuclear Reactor Regulation

Introduction

An onsite audit was conducted by the U.S. Nuclear Regulatory Commission (NRC) project team at the Salem Nuclear Generating Station (SNGS or Salem), Units 1 and 2. On February 19, 2010, the NRC audit team completed the onsite audit of aging management programs (AMPs). The purpose of this audit was to examine the applicant's AMPs for the Salem plants and to verify the applicant's claim of consistency with the corresponding NUREG-801, "Generic Aging Lessons Learned (GALL) Report" AMPs. Exceptions to the GALL Report AMP elements are evaluated separately as part of the NRC staff's review of the license renewal application (LRA) and documented in the staff's Safety Evaluation Report (SER).

The Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (NUREG-1800, Revision 1) provides the staff guidance for reviewing an LRA. The Standard Review Plan allows an applicant to reference in its LRA the AMPs described in the GALL Report. If an applicant credits an AMP for being consistent with a GALL Report program, it is incumbent on the applicant to ensure that the plant program contains all of the elements of the referenced GALL Report program. The applicant's determination should be documented in an auditable form and maintained onsite.

During this audit, the staff audited program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), and program element 10 (operating experience), of the applicant's AMPs claimed to be consistent with the GALL Report against the equivalent elements of the associated AMP described in the GALL Report, unless otherwise indicated in this audit report. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) were audited by another NRC project team during the Scoping and Screening Methodology Audit and are evaluated separately. In addition, the staff verified the conditions at the plant were bounded by the conditions for which the GALL Report program was evaluated.

The staff also examined the applicant's program bases documents and related references for these AMPs and interviewed SNGS representatives to obtain additional clarification related to the AMPs.

Salem Nuclear Generating Station

LRA Section B.2 Aging Management Programs

LRA Section B.2.1 1801 Chapter XI AMPs

LRA AMP B.2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

In the Salem Nuclear Generating Station (SNGS) license renewal application (LRA), the applicant states that AMP B.2.1.1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD", is an existing program that is consistent with the program elements in Generic Aging Lessons Learned (GALL) Report aging management program (AMP) XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), and program element 10 (operating experience) and the description of the program as contained in the LRA Appendix A.2.1.1, Updated Final Safety Analyses Report (UFSAR) Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the Safety Environmental Report (SER).

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "Class 1," "weld," "examination," "ISI," "inspection," "indication," "crack," "flaw," and "internal."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M1	Salem and Hope Creek Program Basis Document – ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Revision 1 7/21/2009
N/A	Salem Units 1 and 2 Operating Experience Summary for: Notifications 20282812, 20231520, 20043770, 20234047, 20233744, 20008368, 20276340, 20276340, 20276363, 20127259, 20062945; Computer generated reports related to these notifications.	
N/A	Salem Unit 1 – Inservice Inspection Program Third 10-Year Interval Long Term Plan	Revision 1 11/2003
N/A	Salem Unit 2 – Inservice Inspection Program Third 10-Year Interval Long Term Plan	Revision 1 11/2003
ERA-AA-330	Conduct of Inservice Inspection Activities	Revision 7
ERA-AA-330-01	Section XI Pressure Testing	Revision 6
ERA-AA-330-02	Inservice Inspection of Section XI Welds and Components	Revision 6
ER-SH-330-0009	PSEG Nuclear Repair Program Manual for the Control of R and NR Certificates of Authorization	Revision 1 10/1/2008

Based on its review of the listed documents and interview with the applicant, the staff confirmed that the applicant's plant configuration is such that all components specified in applicable ASME Code Section XI, Subsections IWB, IWC, and IWD, examination categories can be inspected and that none have been excluded from inspection based on consideration of the burden upon the licensee that could result if requirements to inspect the component were imposed on the facility. This is consistent with the scope of program described in GALL AMP XI.M1, Element 1.

The staff noted that SNGS' current third 10-year inservice inspection interval is in accordance with 10 CFR 50.55a, but is based on ASME Code Section XI, 1998 edition through 2000 addenda, which is different from the code edition and addenda referenced in the GALL Report. However, the staff has previously determined that use of code editions and addenda dated 1995 or later and approved in accordance with 10 CFR 50.55a is acceptable and that an applicant's use of such code editions during its current inservice inspection interval should not be classified as exceptions to recommendations in the GALL AMP XI.M1.

During the audit of program elements 1-6, the staff found that:

> Elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored/inspected, monitoring and trending, and acceptance criteria) of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP is consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element 4 is consistent with the corresponding element of the GALL Report AMP, the staff indicated that it would consider issuing a request for additional information (RAI) for the following subjects:

> In element 4 of the LRA AMP, the program basis document states that for the current risk informed inservice inspection interval (RI-ISI) alternative requirements apply to Categories B-F, B-J, C-F-1 and C-F-2 piping welds; and the description of the AMP in LRA Section B.2.1.1 stated, "The Salem ASME Section XI program also includes a Risk-Informed Inservice Inspection (RI-ISI) program." In the GALL Report AMP, the recommendations in element 4 are based on ASME Code Section XI requirements for examinations as specified for the various component examination categories in IWB-2500, IWC-2500 and IWD-2500. It is not clear to the staff that the statements in the SNGS program basis document and in the LRA are consistent with the recommendations in the GALL Report because it is not clear whether the statements in the LRA AMP and in LRA Section B.2.1.1 refer to only the current ISI interval, which does not carry forward into the period of extended operation, or whether the statements mean that the applicant is proposing in the LRA to continue implementation of alternate methods during the period of extended operation.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.2 Water Chemistry

In the SNGS LRA, the applicant states that AMP B2.1.2, "Water Chemistry," is an existing program that is consistent with the program elements in GALL Report AMP XI.M2, "Water Chemistry." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "chemistry," "corrosion," "pH," "dissolved oxygen," and "cracking."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M2	Water Chemistry	Revision 2 11/19/2009
EPRI 1014986	Pressurized Water Reactor Primary Chemistry Guidelines	Revision 6

Document	Title	Revision / Date
		12/2007
EPRI 1008224	Pressurized Water Reactor Secondary Water Chemistry Guidelines	Revision 6 12/2004
CY-AP-120-100	Reactor Coolant System Chemistry	Revision 11 Not dated
CY-AP-120-1000	Primary Strategic Water Chemistry Plan for Recirculating Steam Generator Plants	Revision 12 Not dated
CY-AP120-200	Recirculating Steam Generator Chemistry	Revision 6 Not dated
CY-AP-120-2000	Secondary Strategic Water Chemistry Plan for Recirculating Steam Generator Plants	Revision 5 Not dated
CR Number 20093219	1CP71 (SCC) Actuator Diaphragm Leaks	3/06/2002 Not dated

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.3 Reactor Head Closure Studs

In the SNGS LRA, the applicant states that AMP B.2.1.3, “Reactor Head Closure Studs,” is an existing program that is consistent with the program elements in GALL Report AMP XI.M3, “Reactor Head Closure Studs.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, LRA Appendix A.2.1.3. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “head stud,” “head bolt,” “examination,” “closure studs,” “torque,” “preload,” “lubricant,” “galling,” and “tensioner.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M3	Salem and Hope Creek Program Basis Document for Reactor Head Closure Studs	Revision 2 12/09/2009
N/A	Salem Inspection Results (Component History Reports) for Reactor Pressure Vessel Closure Stud Assemblies (Studs, Washers, and Nuts)	Reports dated 12/04/2008
SC.MD-FR.FH-0006(Q)	Salem Procedure: Reactor Vessel Head Reassembly	Revision 22 9/21/2006
Product V075440	Material Safety Data Sheet for NEV-SZ NUCLEAR NG-8 from Bostik Findley	9/17/2004
Item No. 51269	Material Safety Data Sheet for N-5000 High Purity Anti-Seize from Loctite	8/19/2004
Product Name: DAG 156	Material Safety Data Sheet for DAG 156 Graphite in Isopropanol from Acheson Colloids Company	6/08/2004
CICP Number: 0100-0102	Material Safety Data Sheet for Neolube No. 1 from Huron Industries, Inc.	1/01/2002

Based on its review of the listed documents and interview with the applicant, the staff confirmed that the applicant does not use thread coatings or lubricants containing molybdenum disulfide (MoS_2) on the reactor head closure studs. Although it is not specifically referenced in GALL AMP XI.M3, NUREG-1339, “Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants,” includes recommendations that thread lubricants containing MoS_2 not be used because its use increases the likelihood of cracking due to stress corrosion in high strength bolts. The staff finds the applicant’s restrictions with regard to use of MoS_2 to be consistent with GALL AMP XI.M3, Element 2, which states that preventive actions includes use of acceptable surface treatments and stable lubricants.

During the audit of program elements 1-6, the staff found that:

> Elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored/inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether LRA program element 4 is consistent with the corresponding element of the GALL Report AMP, the staff indicated that it would consider issuing an RAI for the following subject:

> In its review of element 4 of the LRA AMP, the staff found that the applicant performs volumetric (not volumetric and surface) examination of reactor head closure studs when they are removed from the reactor vessel flange. In the GALL Report AMP element 4 states that Examination Category B-G-1 for pressure-retaining bolting greater than 2 inches diameter in reactor vessel specifies surface and volumetric examination of studs when they are removed from the reactor vessel. It is not clear to the staff that these statements are consistent because the applicant does not routinely perform surface examinations of reactor vessel head closure studs when they are removed from the vessel flange.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.4 Boric Acid Corrosion Control

In the SNGS LRA, the applicant states that AMP B.2.1.4 "Boric Acid Corrosion Control Program," is an existing program that is consistent with the program elements in GALL Report AMP XI.M10 "Boric Acid Corrosion." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "boric acid," "corrosion," "loss of material," "weld," and "pitting."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. ER-AP-331	Boric Acid Corrosion Control (BACC) Program	Revision 4 Not dated
2. EPG-15 (enclosure to ER-AP-331)	Engineering Program Guide Boric Acid Corrosion Control Program (BACC)	No Revision No. 10/2008
3. ER-AP-331-1001	Boric Acid Corrosion Control Inspection Locations, Implementation, and Inspection Guidelines	Revision 4 Not dated
4. ER-AP-331-1002	Boric Acid Corrosion Control Program Identification, Screening, and Evaluation	Revision 5 Not dated
5. ER-AP-331-1003	RCS Leakage Monitoring and Action Plan	Revision 3 Not dated
6. OU-AA-335-015	VT-2 Visual Examination	Revision 0 Not dated
7. NRL-N88081	Response to Generic Letter 88-05 Salem Generating Station Unit Nos. 1 and 2	No Revision No. 5/27/1988
8. LR-N02-0108	Response to NRC Bulletin 2002-01, Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity Salem Nuclear Generating Station Units 1 and 2 Facilities Operating Licenses Nos. DPR-70 and DPR-75	No Revision No. 4/01/2002
9. CR20445543	Panel-Dried Boric Acid on Fittings	No Revision No. 1/04/2010
10. NRC Combined Report 50-272/87-24 and 50-311/87-25	Combined Inspection 50-272/87-24 and 50-311/87-25 (NRC report on routine resident safety inspection)	No Revision No. 9/24/1987

Document	Title	Revision / Date
11. CR0000600055491	Boric Acid Leak–12SF67 Gasket Minor	No Revision No. 12/27/2004

During the audit of program elements 1-6, the staff found that:

> Elements1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation. Several instances of operating experience not in the LRA were discussed with members of the applicant's engineering staff. This included examples of initial observations of corrosion and the subsequent assessment of the leakage severity and consequences conducted by cognizant engineering staff. In addition, clarifying information was provided regarding operating experience described in Section B.2.1.4 in the LRA. The additional information (ref. 10 in the above table), described the direct measurement technique used to quantify the extent of observed pitting corrosion detected in the AMP inspection process.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.6 Cast Austenitic Stainless Steel (CASS)

LRA AMP BXI.M10 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel

In the SNGS LRA, the applicant states that AMP A.2.110, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," is an existing program that is consistent with the program elements in GALL Report AMP XI.M10, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement Section A.2.1.10. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "cracking," "SCC," "CASS," "indication," and "flaw."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
GALL AMP XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Revision1 2001
HCGS LRA A2.1.10	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	8/18/2009
HCGS LRA B2.1.10	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	8/18/2009
HC-PBD-AMP-XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program Basis Document	Revision 1 7/22/2009
LR-N05-0337	Letter from PSEG to NRC, ISI Inspection Activities – 90 day report, Thirteenth Refueling Outage HCGS Docket No. 50-354	8/08/2006
RA-08-030	Letter from Oyster Creek NGS to NRC License Renewal Commitment Docket No. 50-219	4/09/2008
OU-AA-122	Qualification and Certification of Nondestructive Exam Personnel	Revision 2

During the audit of program elements 1-6, the staff found that

> Elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP, verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging, and verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.8 Flow Accelerated Corrosion

In the SNGS LRA, the applicant states that AMP B2.1.8, "Flow Accelerated Corrosion," is an existing program that is consistent with an exception to the program elements in GALL Report AMP XI.M17, "Flow-Accelerated Corrosion." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit.

One exception affects LRA program element 1 (scope of program) and element 4 (detection of aging effects). In the GALL Report AMP, these program elements recommend using the EPRI guidelines contained in Nuclear Safety Analysis Center-202L-R2, "Recommendations for an Effective Flow Accelerated Corrosion Program" (NSAC-202L-R2), to assure that the structural integrity of all carbon steel lines and valve bodies containing single-phase and two-phase high-energy fluids is maintained. In the LRA, the applicant states that the flow-accelerated corrosion (FAC) AMP is based on the EPRI guidelines found in NSAC-202L-R3. The staff previously reviewed NSAC-202L-R3 (NUREG-1929, Volume 2) and determined that it is equivalent to NSAC-202L-R2 and in addition, allows the use of the Averaged Band Method, which is another method for determining wear of piping components from ultrasonic testing (UT) inspection. The staff notes that EPRI documents are created using industry experience over several years and finds that the Averaged Band Method provides another method to determine the wear of piping components from UT inspections. The staff finds this method to be more accurate, thereby resulting in better prediction of remaining life and less rework. The staff finds the use of EPRI NSAC-202L-R3 acceptable because it will continue to allow the applicant to manage wall thinning due to FAC on the internal surfaces of carbon and low alloy steel piping and components that contain both single-phase and two-phase high-energy fluids.

During its audit, the staff reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "flow accelerated corrosion," "FAC," and "corrosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
NSAC-202L	Recommendations for an Effective Flow Accelerated Corrosion Program	Revision 2 4/1999
NSAC-202L	Recommendations for an Effective Flow Accelerated Corrosion Program	Revision 3 12/2006
EPRI 1013012	Determining Piping Wear Caused by Flow-Accelerated Corrosion from Single-Outage Inspection Data	Revision 0 3/2006
ER-AA-430	Conduct of Flow Accelerated Corrosion Activities	80096880-1201
ER-AA-430-1001	Guidelines for Flow Accelerated Corrosion Activities	80096880-1202

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program.

During the audit, the staff found that:

> Elements 2 (preventive actions), 3 (parameters monitored or inspected), 5 (monitoring and trending), and 6 (acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> Elements 1 (scope of program) and 4 (detection of aging effects) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that elements 1 (scope of program) and 4 (detection of aging effects) of the LRA AMP are equivalent to the corresponding GALL Report AMP is that NSAC-202L-R3 is essentially equivalent to NSAC-202L-R2 and provides an equivalent function of managing the FAC AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.9 Bolting Integrity

In the SNGS LRA, the applicant states that AMP B.2.1.9, "Bolting Integrity," is an existing program with an enhancement and an exception that is consistent with the program elements in GALL Report AMP XI.M18, "Bolting Integrity." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, LRA Section A.2.1.9. For the Bolting Integrity Program, the audit report also considers specific recommendations in the GALL Report related to program element 7 (corrective actions). More general GALL Report recommendations related to program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

There is one enhancement. The enhancement affects LRA program element 7 (corrective actions). This enhancement expands on the existing program element by modifying the existing program to state that the following bolting materials should not be reused: a) Galvanized bolts and nuts; b) ASTM A490 bolts; and c) Any bolt and nut tightened by the turn of the nut method.

In LRA Section A.5, License Renewal Commitment List, Commitment Number 9, the applicant committed to implement this enhancement prior to the period of extended operation.

There is one exception. The exception affects LRA program element 5 (monitoring and trending). In the GALL Report AMP, this program element recommends that if bolting connection for pressure retaining components (not covered by ASME Section XI) is reported to be leaking, then it may be inspected daily, and that if the leak rate does not increase the inspection frequency may be decreased to biweekly or weekly. Alternatively, this program element in the LRA states that the applicant uses its Corrective Action Program to determine an appropriate inspection frequency for identified leaks in bolting connections.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "bolt," "nut," "preload," "torque," "leak," "thread," and "gasket."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M18	Program Basis Document – Bolting Integrity	Revision 2 12/15/2009
OU-AA-335-014	VT-1 Visual Examination	Revision 0
OU-AA-335-015	VT-2 Visual Examination	Revision 0
SH.MD-GP.ZZ-0022	Bolt Torquing and Bolt Sequence Guidelines	Revision 4 6/10/2009
ER-AA-5400-1002	Buried Piping Examination Guide	Revision 1
ER-SH-330-0009	PSEG Nuclear Repair Program Manual	Revision 1
SNGS Notification 20203799	Severely Corroded End Bell Bolting on Heat Exchanger	9/15/2002
SNGS Notification 20260898	Evaluate Torque Procedure/Gasked Preload	11/10/2005
SNGS Notification 20283729	Service Water Strainer Bonnet Studs Broken	5/02/2006
SNGS Notification 20293238	Polar Crane Rail Bolts Not Checked	8/08/2006

The staff noted that the applicant's program basis document for AMP B.2.1.9 states that the Bolting Integrity Program follows published EPRI NP-5769 guidelines for safety-related bolting, with the exceptions noted in NUREG 1339, and that material procurement, use of approved lubricants and sealants, proper torquing for preload control, and leakage evaluations are in accordance with applicable EPRI NP-5769 and TR-104213 recommendations. Because these EPRI guidance documents are referenced in GALL AMP XI.M18, Elements 1 and 2, the staff finds the applicant's incorporation of guidance from these documents into its Bolting Integrity Program to be acceptable.

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program element 5 (monitoring and trending) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

> Elements 3, 4, 5, and 6 (parameters monitored orinspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was not available to determine whether elements 1 and 2 (scope of program, and preventive actions) of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether LRA program elements 1 and 2 are consistent with the corresponding elements of the GALL Report AMP, the staff indicated that it would consider issuing RAIs for the following subjects:

> In its description of the LRA AMP, the applicant states that component support and structural bolting are managed as part of the Structures Monitoring Program, crane and hoist bolting is managed as part of the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program, aging management of heating and ventilation bolted joints is managed by the External Surfaces Monitoring Program, and bolting in a buried environment is managed by the Buried Piping Inspection Program. In the GALL Report AMP, element 1 states that the program covers bolting within the scope of license renewal, including 1) safety-related bolting, 2) bolting for nuclear steam supply system (NSSS) component supports, 3) bolting for other pressure retaining components, including non-safety related bolting, and 4) structural bolting (actual measured yield strength ≥150 ksi). Also, in the GALL Report AMP element 2 states that selection of bolting material and use of lubricants and sealants is in accordance with the guidelines of EPRI NP-5769, and the additional recommendations in NUREG-1339, and the bolting replacement activities include proper torquing and application of appropriate preload based on the EPRI documents. It is not clear to the staff that the applicant's statement about the LRA AMP is consistent with the recommendations of the GALL Report AMP because it is not clear to the staff that all recommendations credited with managing the aging effects of bolting in the elements of GALL AMP XI.M18 are included in other programs that the applicant credits with managing aging effects of bolting. Also it is not clear to the staff how procurement, control of lubricants and sealants, application of appropriate preloads, and proper torquing of bolts are incorporated in the other programs credited by the applicant because those programs primarily involve inspection activities.

During the audit of program element 10, (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement, LRA Section A.2.1.9. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of

LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.10 Steam Generator Tube Integrity

In the SNGS LRA, the applicant states that AMP B.2.1.10, "Steam Generator Tube Integrity," is an existing program that is consistent with the program elements in GALL Report AMP XI.M19, "Steam Generator Tube Integrity." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
ER-AP-420	Steam Generator Management Program	Revision 7
ER-AP-420-0051	Conduct of SG Management Activities	Revision 13
OU-AP-335-039	ECT Data Acquisition Procedures	
OU-AP-335-040	ECT Data Analysis Procedures	
OU-SA-335-1011	ECT Data Analysis Guidelines for Unit 1	
CY-AP-120-340	Primary to Secondary Leakage Monitoring Procedures	
	Degradation Assessment for 1R18	

During the audit of program elements 1-6, the staff found that program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP. The staff noted one discrepancy in the LRA AMP relative to the GALL AMP which the applicant will fix under its corrective action program. The applicant's procedure CY-AP-120-340, "Primary to Secondary Leakage Monitoring Procedures," requires entry into Action Level 3, Condition 1 when primary to secondary leakage equals or exceeds 140 gallons per day (gpd) in any steam generator. The GALL Report references NEI 97-06 which in turn references EPRI report 1008219, "PWR Primary to

Secondary Leakage Guidelines." Revision 3 of these guidelines requires entry in Action Level 3, Condition 1 when primary to secondary leakage is increasing by greater than or equal to 30 gpd/hour and is equal to or exceeding 75 gpd. The applicant representatives stated the plant procedure was incorrect. The applicant has entered this into its corrective action program as Notification 20451464.

During the audit of program element 10 (operating experience), the staff found that the operating experience provided by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff) and is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP B.2.1.10;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.11 Open-Cycle Cooling Water System

In the SNGS LRA, the applicant states that AMP B2.1.11, "Open-Cycle Cooling Water System" is an existing program that is consistent with the program elements in GALL Report AMP XI.M20, "Open-Cycle Cooling Water System." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "corrosion," "microbiological corrosion," "MIC," and "chemistry."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M20	Open-Cycle Cooling Water Program	Revision 2 10/09/2009
CY-AA-120-410	Circulating/Service Water Chemistry	Revision 2 Not dated
CY-AA-120-4110	Raw Water Chemistry Strategic Plan	No Revision No. Not dated
ER-AA-340-1002	Service Water Heat Exchanger Inspection Guide	Revision 3 Not dated
ER-AA-2030	Conduct of Plant Engineering Manual, Step 4.5.2, Step 4.6.5, Attachment 4	Revision 8 Not dated
S1.OP-PM.SW-0001	Flush of Emergency Diesel Generator SW Supply Header	Revision 1 Not dated
SC.MD-PM.CC-0002	Component Cooling Heat Exchangers 11, 21 and 22 Internal Inspection (6Y)	Revision 13 Not dated
Operator Training Presentation	Performance Monitoring-Equipment Reliability Due to Aging and Degradation	Revision 0 12/16/2009
CR Number 20242247	"B" SW Strainer Corrosion	No Revision No. 6/09/2005
CR Number 20283729	SW Strainer Bonnet Studs	No Revision no. 7/31/2006

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.12 Closed-Cycle Cooling Water System

In the SNGS LRA, the applicant states that AMP B2.1.12, “Closed-Cycle Cooling Water,” is an existing program with enhancements and an exception that is consistent with the program elements in GALL Report AMP MI.X21, “Closed-Cycle Cooling Water System.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 2 (preventative actions), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding analyses for sulfates in the Component Cooling System. This enhancement to the Closed-Cycle Cooling Program will make this program consistent with EPRI standards.

The second enhancement affects LRA program element 2 (preventative actions), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding analyses for azole or ammonia, chlorides, fluorides, and microbiologically-influenced corrosion (MIC) in the emergency diesel generator jacket water system.

The third enhancement affects LRA program element 2 (preventative actions), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by implementing a chemistry program or hardware change to bring the Chilled Water System parameters into compliance with EPRI TR 1007820, prior to the period of extended operation.

The fourth enhancement affects LRA program element 2 (preventative actions), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by implementing a pure water chemistry program to the Heating Water and Heating Steam System in accordance with EPRI TR 1007820, prior to the period of extended operation.

The fifth enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding new recurring tasks to enhance the performance monitoring of selected heat exchangers cooled by the Component Cooling System.

The sixth enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding new recurring tasks which enhances the performance monitoring of selected Chilled Water System components.
The seventh enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects), and element 6 (acceptance criteria). This enhancement expands on the existing program element by adding a one-time inspection of selected Closed-Cycle Cooling Water Program components in stagnant flow areas to confirm the effectiveness of the Closed-Cycle Cooling Water Program. These inspections will be performed prior to the period of extended operation.

The eighth enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding one-time inspection of selected components for selected Chilled Water System piping to confirm the effectiveness of the Closed-Cycle Cooling Water Program. These inspections will be performed prior to the period of extended operation.

The ninth enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects) and element 6 (acceptance criteria). This enhancement expands on the existing program element by adding a one-time inspection of selected Closed-Cycle Cooling Water Program chemical mixing tanks and associated piping to confirm the effectiveness of Closed-Cycle Cooling Water Program on the interior surfaces of the tanks and associated piping. These inspections will be performed prior to the period of extended operation.

The tenth enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding new recurring tasks to enhance the monitoring of selected Heating Water and Heating Steam System components.

The eleventh enhancement affects LRA program element 3 (parameters monitored or inspected), element 4 (detection of aging effects) and element 5 (monitoring and trending). This enhancement expands on the existing program element by adding a one-time inspection of selected Heating Water and Heating Steam System piping to confirm the effectiveness of the Closed-Cycle Cooling Water Program. These inspections will be performed prior to the period of extended operation.

The first exception affects LRA program elements 2-5 (preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending). In the GALL Report AMP, these program elements recommend the use of EPRI Closed Cooling Water Chemistry Guidelines, TR107396 Rev. 0. Alternatively, the applicant has indicated that the Closed-Cycle Cooling Water System Program is based on Revision 1 of this document, which was published in 2004 and is cited as EPRI TR 1007820.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "corrosion," "pH," "chloride," and "chemistry."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M21	Closed-Cycle Cooling Water Program	Revision 2 12/14/2009
SC.CH-TI.ZZ-0180(Q)	Sampling Schedule and Chemistry Specifications	Revision 59 Not dated
SC.MD-PM.CH-002(Q)	Chiller Condenser Heat Exchanger Internal Inspection and Leak Check	Revision 11 6/13/2006
S1.OP-PT.SW-0006	Service Water Fouling Monitoring Diesel Generators	Revision 8 Not dated
SC.MD-PM-DG-0017(Q)	Diesel Generator Lube Oil and Jacket Water Cooler Internal Inspection	Revision 4 10/08/2003
CY-AA-120-400	Closed Cooling Water Chemistry	Revision 11 Not dated
CY-AA-120-4000	Closed Cooling Water Chemistry Strategic plan	Revision 4 Not dated
EPRI TR 1007820	Closed Cooling Water Chemistry Guideline	Revision 1 4/2004
Operator Training Presentation	Performance Monitoring-Equipment Reliability Due to Aging and Degradation	Revision 0 12/16/2009
CR Number 20299149	"C" EDG L. O. STR Has Small Seal Leakage	No Revision No. 3/04/2007
CR 20072786	Chilled Water PH, S1, Close To High Limit	No Revision No. 7/25/2001

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program elements 2-6 (preventative actions, parameters monitored or inspected, monitoring and trending, acceptance criteria) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

> Elements 1-6 (scope, preventative actions, parameters monitored or inspected, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP,

as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.13 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

In the SNGS LRA, the applicant states that AMP B2.1.13 “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems,” is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M23, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement A.1.13. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 1 and 3 (scope of program and parameters monitored or inspected). This enhancement expands on the existing program element by adding visual inspection of structural components and structural bolts for loss of material due to general corrosion, pitting, and crevice corrosion and structural bolting for loss of preload due to self-loosening.

The second enhancement affects LRA program elements 1 and 3 (scope of program and parameters monitored or inspected). This enhancement expands on the existing program element by adding the requirement for visual inspection of the rails and the rail system for loss of material due to wear.

The third enhancement affects LRA program element 6 (acceptance criteria). This enhancement expands on the existing program element by requiring evaluation of significant

loss of material due to corrosion for structural components and structural bolts, and significant loss of material due to wear of rail in the rail system.

In Appendix A Table A-5 of the LRA, Commitment No. 13, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "heavy load," "handling," "polar crane," and "overhead." During the interview, the staff requested clarification on whether structural bolting, which is inspected as part of this program, is also included in the Bolting Integrity Program. The applicant responded that the structural bolting associated with the overhead handling systems is not included in the Bolting Integrity Program, and that the Bolting Integrity Program states that some bolting is included in other AMPs including this one. The staff was satisfied with the response.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Crane Manufactures Association of America, Inc, CMAA Specification No. 70	Specifications for Electrical Overhead Traveling Cranes	1970
2. ASME/ANSI B30.2	Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top running Trolley Hoist)	1976
3. ASME/ANSI B30.10	Hooks	2005
4. ASME/ANSI B30.11	Monorails and Under hung Cranes	2004
5. ASME/ANSI B30.16	Overhead Hoists (Under hang)	2003
6. NUREG-0612	Control of Heavy Loads at Nuclear Power Plants, U.S. Nuclear Regulatory Commission	1980
7. NRC Bulletin 96-02	Movement of Heavy Loads Over the Spent Fuel, over Fuel in the Reactor Core, or Over Fuel in the Reactor Core, or Over Safety-Related Equipment	4/11/1996
8. SH-PBD-AMP-XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

> Elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.14 Compressed Air Monitering

In the SNGS LRA, the applicant states that AMP B2.1.14, "Compressed Air Monitoring," is an existing program that is consistent with the program elements in GALL Report AMP XI.M24, "Compressed Air Monitoring." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "corrosion," "rust," and "piping."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M24	Compressed Air Monitoring	Revision 2 12/16/2009
NRC Generic Letter 88-14	Instrument Air Supply Problems Affecting Safety-Related Components.	Revision 0 8/8/1988
	PSEG Salem and Hope Creek Response to Generic Letter 88-14	Revision 0 12/06/1988
S1.OP-LR.CA-0006	Leak Rate Test 1CA2086	Revision 0 Not dated
NPO SOER 88-01	Instrument Air System Failures	No Revision No. 5/18/1988
EPRI TR-108147	Compressor and Instrument Air System Maintenance Guide Revision to NP-7079	No Revision No. 5/18/1988
CR 20240923	Service Air Piping Full Of Rust Products	No Revision No. 5/31/2005

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.15 Fire Protection Program

In the SNGS LRA, the applicant states that AMP B2.1.15, “Fire Protection Program,” is an existing program with enhancements and an exception that is consistent with the program elements in GALL Report AMP XI.M26, “Fire Protection.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, Appendix A2.1.15. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 3, 4, 5 and 6 (parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program elements by providing additional inspection guidance to identify degradation of fire barrier walls, ceilings, and floors for aging effects, such as cracking, spalling and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates.

The second enhancement affects LRA program elements 3, 4, 5, and 6 (parameters monitored or inspected, detection of aging effects, monitoring and trending and acceptance criteria). This enhancement expands on the existing program elements by providing specific guidance for examining exposed external surfaces of the fire pump diesel fuel oil supply line for corrosion during pump tests.

In Appendix A, Table A-5 of the LRA, in Commitment No. 15, the applicant committed to implement these enhancements prior to the period of extended operation.

The exception affects LRA program elements 3 and 4 (parameters monitored or inspected and detection of aging effects). In the GALL Report AMP, this program element recommends a visual inspection and function test of the Halon and carbon dioxide (CO_2) systems every six months. Alternatively, this program element in the LRA states that the Halon and CO_2 fire suppression systems currently undergo functional testing every refueling cycle (18-months).

During its audit, the staff interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using the keywords: “seal rupture,” “fire degradation,” and “diesel fire pump.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M26	Program Basis Document – GALL Program XI.M26	Revision 1 8/21/2009
FP-AA-005	Fire Protection Surveillance and Periodic Test Program	Revision 0

Document	Title	Revision / Date
SC.FP-SV.FBR-0026 (Q)	Flood and Fire Barrier Penetration Seal Inspection	Revision 3
S1.FP-SV.FBR-0027 (Q)	Class 1 Fire Door Inspection and Operability Test	Revision 4
S2.FP-SV.FBR-0027 (Q)	Class 1 Fire Door Inspection and Operability Test	Revision 5
S1.FP-SV.FBR-0031 (Q)	Class 1 Fire Damper Visual Inspection	Revision 3
S2.FP-SV.FBR-0031 (Q)	Class 1 Fire Damper Visual Inspection	Revision 4
S1.FP-ST.FS-0048 (Q)	Halon 1301 System Functional Test and Inspection	Revision 3
S2.FP-ST.FS-0048 (Q)	Halon 1301 System Functional Test and Inspection	Revision 3
CR 20351320	Floor penetration seal is damaged	1/09/2008
CR 20394911	Flood barrier at fire door needs to be re-caulked	12/16/2008

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program element 3 (parameters monitored or inspected) and program element 4 (detection of aging effects) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception(s) were evaluated and are described below.

During the audit, the staff found that:

> Elements 1, 2, 3, and 5 (scope of program, preventive actions, parameters monitored or inspected, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was not available to determine whether elements 4 and 6 (detection of aging effects and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 4 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff indicated that it would consider issuing RAIs for the following subjects:

> In element 4 of the GALL AMP, it states that visual inspections of the Halon/CO_2 fire suppression system detect any sign of added degradation, such as corrosion, mechanical damage, or damage to dampers. In element 6 of the GALL AMP it states that any signs of corrosion and mechanical damage of the Halon/CO_2 fire suppression system are not acceptable. However, based on a review of the program basis document that references procedures S1(2).FP-SV.FS-0019 (Q), S1(2).FP-ST.FS-0048 (Q), and S1(2).FP-ST.FS-0021 (Q), it was not clear if the applicant performs the visual inspection nor was it clear what acceptance criteria are used.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP,

as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A2.1.15. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.16 Fire Water System

In the SNGS LRA, the applicant states that AMP B2.1.16, “Fire Water System,” is an existing program with enhancements and exceptions that is consistent with the program elements in GALL Report AMP XI.M-27, “Fire Water System.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement A1.16. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 2-6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program elements to inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations, and that these inspections shall be performed prior to the period of extended operation and will be performed every ten years thereafter.
The second enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program elements to replace or perform 50-year sprinkler head inspections and testing using the guidance of NFPA-25 “Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems” (2002 Edition), Section 5-3.1.1. These inspections will be performed by the 50-year inservice date and every ten years thereafter.

In Appendix A, Table A-5 of the LRA, in Commitment Number 16, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "biofouling" and "MIC."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M27	Program Basis Document, Fire Water System	Revision 1
FP-AA-005	Fire Protection Surveillance and Periodic Test Program	Revision 0
SC.FP-ST.FS-0008 (Q)	Fire Main Flow Test	Revision 1
SC.FP-ST.FS-0004 (Q)	Fire Suppression water System flush	Revision 5
ND.FP-ST.FS-0037 (Q)	Fire Hose Service Test and EP Equipment Inspection	Revision 1

The staff asked the applicant to clarify whether gasket inspections are performed as part of the fire hose inspection. The applicant clarified that gaskets are considered short-lived components, because if the fire hose leaks during the hydrotest, the gasket is inspected and replaced if degraded. The staff considers this to be consistent with the GALL AMP.

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A2.1.16. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.17 Aboveground Steel Tanks

In the SNGS LRA, the applicant states that AMP B.2.1.17, "Aboveground Steel Tanks," is an existing program with enhancements, that is consistent with the program elements in GALL Report AMP XI.M29, "Aboveground Steel Tanks." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 4, 5, and 6 (detection of aging effects, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element by adding ultrasonic inspection of the fire water storage tanks. The enhancement is provided to measure corrosion of bottom surfaces on those specific tanks, which are mounted on concrete pads, where visual inspection is not practicable due to inaccessibility.

The second enhancement affects LRA program elements 2, 4, 5, and 6 (preventive actions, detection of aging effects, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element by adding visual inspection of the grout and steel/concrete interfaces in addition to the visual inspection of the Fire Water Storage Tank surfaces. Note that the fire protection water storage tanks are the only type of aboveground steel tanks at SNGS that are in-scope for this AMP.

In A.2.1.17 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "corrosion," "tank," and "steel."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Document	Title	Revision / Date
SH-PBD-AMP-XI.M29	Program Basis Document Aboveground Steel Tanks	Revision 1 8/18/2009
Notification 20122414	External Coating Breakdown Identified	No Revision No. 11/21/2002
Order No. 80096880-2103	One-Time Fire Water Protection Storage Tank, S1FW-1FWE16 UT Internal Tank Bottom Inspection of the No. 1 Freshwater and Firewater Protection Storage Tank	No Revision No. Not dated
OU-AA-335-015	VT-2 Visual Examination	Revision 0 Not dated
SH-RA-IS.ZZ-0109(Q)	Storage Tank Integrity Testing	Revision 4 12/12/2001
No document No. (presentation)	Performance Monitoring–Equipment Reliability Due to Aging and Degradation	Revision 0 12/16/2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

> Elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent, with enhancements, with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.18 Fuel Oil Chemistry

In the SNGS LRA, the applicant states that AMP B.2.1.18, "Fuel Oil Chemistry," is an existing program with enhancements and exceptions that is consistent with the program elements in GALL Report AMP XI.M30, "Fuel Oil Chemistry." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), and 4 (detection of aging effects). This enhancement provides equivalent requirements for fuel oil purity and fuel oil testing, as described by the Standard Technical Specifications.

The second enhancement affects LRA program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), 5 (monitoring and trending), and 6 (acceptance criteria). This enhancement provides analysis for particulate contamination in accordance with modified ASTM 2276-00 Method A. The modification consists of using a filter with a pore size of 3.0 microns instead of 0.8 microns.

The third enhancement affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), and 7 (corrective actions). This enhancement requires the addition of biocides, stabilizers and corrosion inhibitors as determined by fuel oil sampling or inspection activities.

The fourth enhancement affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 5 (monitoring and trending). This enhancement provides quarterly analysis for bacteria in new and stored fuel oil.

The fifth enhancement affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), and 4 (detection of aging effects). This enhancement requires visual inspection of the internal surfaces of the 350-gallon fire pump day tanks (S1DF-1DFE21 and S1DF-1DFE23) that have been drained for cleaning and sediment removal. Ultrasonic thickness examination of tank bottoms is also included.

The sixth enhancement affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 5 (monitoring and trending). This enhancement provides API gravity and flash point testing of new fuel prior to unloading the new fuel.

The seventh enhancement affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), and 4 (detection of aging effects). This enhancement provides visual inspection of the internal surfaces of the diesel fuel oil storage tanks (S1DF-1DFE1, S1DF-1DFE2, S2DF-2DFE1 and S2DF-2DFE2) that have been drained for cleaning and sediment removal. Ultrasonic thickness examination of tank bottoms is also included.

The eighth enhancement affects LRA program elements 1 (scope of program), 3 (parameters monitored or inspected), and 4 (detection of aging effects). This enhancement verifies the absence of any significant aging effects of each of the 550-gallon diesel fuel oil day tanks, by performing a one-time inspection.

In Appendix A, Table A.5 of the LRA, in Commitment No. 18, the applicant committed to implement these enhancements prior to the period of extended operation.

The first exception affects LRA program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 6 (acceptance criteria). The GALL Report AMP requires periodic sampling of tanks in accordance with the manual sampling standards of ASTM D 4057-95 (2000). The applicant stated that the 20,000-barrel fuel oil storage tank (S1DF-1DFE13) samples are single point samples obtained from the tank drain line located off of the bottom of the tank. This sample is not in accordance with the manual sampling standards as described in ASTM D 4057. The applicant further stated that the sample results are more likely to capture contaminants, water, and sediment, thus making this a conservative sample location for fuel oil containments.

The second exception affects LRA program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 6 (acceptance criteria). The GALL Report AMP requires periodic sampling of tanks in accordance with the manual sampling standards of ASTM D 4057-95 (2000). The applicant stated that the 350-gallon fire pump day tanks (T-565) samples are single point samples obtained from the tank sight glass drain line located a few inches above the bottom of the tank. This sample is not in accordance with the manual sampling standards as described in ASTM D 4057. The applicant further stated that for fuel oil storage tanks of less than 159 cubic meters spot sampling recommendations in ASTM D 4057-95 (2000) include a single sample from the middle (a distance of one-half of the depth of liquid below the liquid's surface). The 350-gallon Fire Pump Day Tanks are 1.3 cubic meters so the spot sampling recommendations in ASTM D 4057 are applicable. Although the actual sample location for tanks is lower than prescribed by the ASTM D 4057 standard, the sample results are more likely to capture contaminants, water, and sediment, thus making this a conservative sample location for fuel oil containments.

The third exception affects LRA program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 6 (acceptance criteria). The GALL Report AMP requires periodic sampling of tanks in accordance with the manual sampling standards of ASTM D 4057-95 (2000). The applicant stated that the 30,000-gallon diesel fuel oil storage tanks (S1DF-1DFE1, S1DF-1DFE2, S2DF-1DFE1 and S2F-1DFE2) samples consist of 4 samples drawn from 2 locations on the tank. One is from the level instrumentation block drain, which is located a few inches above the bottom of the tank. The remaining three samples are taken from the sump drain, which is located on the other side of the tank and is from the bottom of the tank. This sample is not in accordance with the manual sampling standards as described

in ASTM D 4057. The applicant further stated that for fuel oil storage tanks of less than 159 cubic meters spot sampling recommendations in ASTM D 4057-95 (2000) include a single sample from the middle (a distance of one-half of the depth of liquid below the liquid's surface). The 30,000-gallon diesel fuel oil storage tanks are 113.6 cubic meters so the spot sampling recommendations in ASTM D 4057 are applicable. Although the actual sample locations for the tanks are lower than prescribed by the ASTM D 4057 standard, the sample results are more likely to capture contaminants, water, and sediment, thus making this a conservative sample location for fuel oil containments.

The fourth exception affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), 4 (detection of aging effects), 5 (monitoring and trending), and 6 (acceptance criteria). The GALL Report AMP requires periodic sampling, draining, cleaning, and internal inspection of tanks, to reduce the potential for loss of material by exposure to fuel oil contaminated with water and microbiological organisms. The applicant stated that multilevel sampling, tank bottom draining, cleaning, and internal inspection of the 550-gallon diesel fuel oil day tanks (S1DF-1DFE3, S1DF-1DFE4, S1DF-1DFE5, S2DF-1DFE3, S2DF-1DFE4 and S2DF-1DFE5) is not periodically performed. Instead, the applicant stated that fuel oil from the 550-gallon day tanks is recirculated back to the 30,000-gallon storage tanks quarterly. To confirm the absence of any significant aging effects, the applicant will perform a one-time inspection of each of the 550-gallon day tanks and the condition will be entered into the corrective action process for resolution.

The fifth exception affects LRA program elements 1 (scope of program), 2 (preventive actions), 3 (parameters monitored or inspected), 5 (monitoring and trending), and 6 (acceptance criteria). The GALL Report AMP requires the additions of biocides, stabilizers, and corrosion inhibitors to prevent degradation of the fuel oil quality. The Salem Fuel Oil Chemistry AMP does not require the addition of biocides, stabilizers, and corrosion inhibitors, but instead requires their use only in response to test results that indicate biocides, stabilizers, and corrosion inhibitors are needed.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "MIC," "microbiological," "pitting," "corrosion," and "tank."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SC.FO-LB.ZZ-0001, Rev. 0	Salem Diesel Fuel Oil Testing Program	80096880-2201
SH.RA-IS.ZZ-0109, Rev. 4	Storage Tank Integrity Testing	80096880-2203
SC.OP-PT.FO-0001, Rev. 5	Sampling Main Fuel Oil Storage Tank, Fire Pump Day Tank, and Fuel Oil Supply to Unit 3	80096880-2204
NEW	Enhance procedures to include the addition of biocides to minimize biological activity, stabilizers to prevent biological	80096880-22XX

Document	Title	Revision / Date
	breakdown of the diesel fuel, or corrosion inhibitors to mitigate corrosion as determined by fuel oil analysis activities.	
S1255015 Order 30163543	S1DF-1DFE13 – 1Y 1 DFOST Sample Bacteriological Analysis (Enhance to perform quarterly)	80096880-2207
S1100942 Order 30174206	S1DF-1DFE13 – 31D S1DF-1DFE1: Sample; Main F/O Storage (Draining IAW SC.OP-PT.FO.0001 & Sampling IAW SC.FO-LB.ZZ-001)	80096880-2208
S1.OP-ST.FO-0001, Rev. 2	Sampling 11 and 12 Diesel Fuel Oil Storage Tanks	80096880-2209
S2.OP-ST.FO-0001, Rev. 2	Sampling 21 and 22 Diesel Fuel Oil Storage Tanks	80096880-2210

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the exceptions and proposed enhancements. During the audit, the staff found that elements 1-7 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, and corrective actions) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant was sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A2.1.18. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.20 One-Time Inspection Program

In the SNGS LRA, the applicant states that AMP B.2.1.20, “One-Time Inspection Program,” is a new program that is consistent with the program elements in GALL Report AMP XI.M32, “One-Time Inspection.” The applicant committed to implementing this program prior to the period of extended operation in License Renewal Commitment 20 of LRA Section A.5, License Renewal Commitment List. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, Appendix A.2.1.20. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using the keywords: “loss of material,” “stress corrosion cracking,” “fouling,” “MIC,” “microbiological,” “rust,” “pitting,” “stress corrosion cracking,” “microbiological corrosion,” “corrosion,” “internal surface corrosion,” and “weld.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M32	One-Time Inspection – Program Basis Document	Revision 2
LRA Section B.2.1.20	SNGS LRA, Appendix B, One-Time Inspection	
LRA Section A.2.1.20	SNGS LRA, Appendix A, One-Time Inspection	
SNGS1-SSBD-OTI	Salem Unit 1 One-Time Inspection Sample Basis Document	Revision 0
SNGS2-SSBD-OTI	Salem Unit 2 One-Time Inspection Sample Basis Document	Revision 0

During the audit of program elements 1-6, the staff found that:

> Elements 1, 2, 3, 4, 5 and 6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff’s independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff’s independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.21 Selective Leaching of Materials

In the SNGS LRA, the applicant states that AMP B.2.1.21, "Selective Leaching of Materials," is a new program that is consistent with the program elements in GALL Report AMP XI.M33, "Selective Leaching of Materials." The applicant committed to implementing this program in the last ten years of the current term, prior to the period of extended operation in the UFSAR Supplement provided as Appendix A item A.2.1.21 of the Salem LRA. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "leach," "iron," "copper," and "aluminum."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M33	Selective Leaching of Materials	Revision 1 7/14/2009
CR Number 20024078	Aluminum Bronze Bolt Torque Values	3/22/2000

The staff conducted its audit of LRA program elements1-6 based without considering aspects of program elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP which are associated with the exception. Aspects of these elements not associated with the exception were evaluated and are described below.

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the applicant has committed to modify the UFSAR Supplement so as to make the program description adequate.

LRA AMP B.2.1.22 Buried Piping Tanks Inspections

In the SNGS LRA, the applicant states that AMP B.2.1.22, "Buried Piping Inspection," is an existing program with one enhancement that is consistent with the program elements in GALL Report AMP XI.M34, "Buried Piping and Tanks Inspection." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects,

monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Rev. 24. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding an explicit requirement for at least one inspection of each material type (steel, gray cast iron, and ductile cast iron piping) by either an opportunistic or focused excavation and inspection within ten years prior to entering the period of extended operation and again within the first ten years of the period of extended operation.

In A.2.1.24 of the LRA, the applicant committed to implement the enhancement within ten years prior to entering the period of extended operation and again within the first ten years of the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "piping," "corrosion," "loss of material," "pitting," "steel," "iron," "underground," and "buried."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
CR 20229886	Determine Rate of Corrosion of Pipe	Revision D 3/24/2005
ER-AA-5400	Buried Piping Program (BPP) Guide Commitment No. 80096880-2001	Revision 1 Not dated
ER-AA-5400-1002	Buried Piping Examination Guide Commitment No. 80096880-2002	Revision 1 Not dated
SA-AA-117	Excavation, Trenching, and Shoring Commitment No. 80096880-2003	Revision 1 Not dated
CR20094719	IGSC in CCW Piping Welds	No Revision No. 3/22/2002

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

Elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

Element 4 (detection of aging effects) of the LRA AMP was not strictly consistent with the corresponding elements of the GALL Report AMP but that sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding element of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.23 One-Time Inspection of ASME Code Class 1 Small Bore Piping

In the SNGS LRA, the applicant states that AMP B.2.1.23, "One-Time Inspection Program," is a new program with an exception that is consistent with the program elements in GALL Report AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small Bore Piping." The applicant committed to implementing this program prior to the period of extended operation in License Renewal Commitment 23 of LRA Section A.5, License Renewal Commitment List. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, Appendix A.2.1.23. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The exception affects LRA program element 1 (scope of program). The GALL Report AMP references the interim guidance contained in EPRI Report 1000701, "Interim Thermal Fatigue Management Guideline (MRP-24)." Salem uses a more recent revision to the MRP regarding Thermal Fatigue.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "loss of material," "stress corrosion cracking," "fatigue," "cracking," "flaw," "indication," "piping," "pitting," "corrosion," and "weld."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SA-PBD-AMP-XI.M35	One-Time Inspection of ASME Code Class 1 Small-Bore Piping – Program Basis Document	Revision 2
LRA Appendix B, Section B.2.1.23	SNGS LRA, Appendix B, One-Time Inspection of ASME Code Class 1 Small-Bore Piping	
LRA Appendix B, Section B.2.1.23	SNGS LRA, Appendix A, One-Time Inspection of ASME Code Class 1 Small-Bore Piping	
LER #90-005-00	Tech. Spec. 3.0.3 Entry; Two ECCS Subsystems Inoperable EVENT DATE: 01/17/90	2/15/1990
Notification 20366099	NDE of 1" Socket Weld for PP-N058B	4/17/2008
Notification 20366098	NDE of 1" Socket Weld for PP-N058D	4/17/2008
Notification 20365788	NDE of 1" Socket Welds	4/15/2008

During the audit of program elements 1-6, the staff found that:

> Elements 2, 4, 5 and 6 (preventive actions, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was not available to determine whether elements 1 and 3 (scope of program and parameters monitored or inspected) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether LRA program elements 1 and 3 are consistent with the corresponding elements of the GALL Report AMP, the staff indicated that it would consider issuing RAIs for the following subjects:

> GALL AMP XI.M35, element 1 (scope of program) recommends using guidelines in EPRI Report 1000701, "Interim Thermal Fatigue Management Guideline (MRP-24), January 2001," to identify piping susceptible to potential effects of thermal stratification or turbulent penetration. The LRA states that guidelines from EPRI TR-112657, "Revised Risk-Informed Inservice Inspection Evaluation Procedure, Rev. B-A," were used for identifying susceptible piping instead of EPRI Report 1000701. The staff noted that it is not clear if the welds with the highest likelihood of degradation will be inspected, (e.g., welds with the highest stress but not necessarily in the high to medium risk categories). The staff also noted that it is unclear if socket welds are included in the high to medium risk categories and if they will be subject to inspection.
>
> GALL AMP XI.M35, element 3 (parameters monitored/inspected), states that inspections will detect cracking in ASME Code Class 1 small-bore piping. The LRA states that

socket welds that fall within the weld examination sample will be examined using a visual examination (VT-2). The staff notes that a visual inspection of the outside diameter will not detect cracking initiated from the inside of the socket weld before leakage occurs (e.g., stress corrosion cracking).

During the audit of program element 10 (operating experience), the staff found that:

The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAIs for the following subjects:

Appendix A of the LRA states that this program is a part of the SNGS Risk-Informed Inservice Inspection program. The staff noted that it is not clear if the welds with the highest likelihood of degradation will be inspected, (e.g., welds with the highest stress but not necessarily in the high to medium risk categories). The staff also noted that it is unclear if socket welds are included in the high to medium risk categories and if they will be subject to inspection.

Appendix A of the LRA states that in lieu of performing one-time volumetric inspections of socket welds for pipe size less than 4" NPS and greater than or equal to NPS 1, the examination method and frequency will be VT-2. The staff notes that a visual inspection of the outside diameter will not detect cracking initiated from the inside of the socket weld before leakage occurs (e.g., stress corrosion cracking).

Based on this audit the staff:

Verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.24 External Surfaces Monitoring

In the SNGS LRA, the applicant states that AMP B.2.1.24, "External Surfaces Monitoring," is a new program that is consistent with the program elements in GALL Report AMP XI.M36, "External Surfaces Monitoring." The applicant committed to implementing this program prior to the period of extended operation in LRA Section A.2.1.23. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "flaw," "corrosion," "inspection," "MIC," "loss of material," "weld," and "rust."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-Xi-M36	External Surfaces Monitoring	Revision 1 7/29/2009
OU-AA-122	Qualification and Certification of Nondestructive Examination (NDE) Personnel	Revision 1 Not dated
ER-AA-2030	Conduct of Plant Engineering Manual	Revision 7 Not dated
CR000070028817	11RHR HX Stud Failed VT-3 Exam	No Revision No. 1/08/2003
No document No. (Presentation)	Performance Monitoring–Equipment Reliability Due to Aging and Degradation	Revision 0 12/16/2009

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.25 Flux Thimble Tube Inspection

In the SNGS LRA, the applicant states that AMP B.2.1.25, "Flux Thimble Tube Inspection," is a new program that is consistent with the program elements in GALL Report AMP XI.M37, "Flux Thimble Tube Inspection." The applicant committed to implementing this program prior to the period of extended operation in LRA Section A.5, License Renewal Commitment List, Commitment Number 25. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, LRA Section A.2.1.25. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "thimble," "ECT," "eddy current," and "88-09."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SA-PBD-AMP-XI.M37	Salem Program Basis Document – Flux Thimble Tube Inspection	Revision 2 12/08/2009

Document	Title	Revision / Date
S-C-R200-MSE-274	Flux Thimble Tube Ejection and Seal Table Leak; Review of Westinghouse and NRC Documents. Salem Generating Station, Units 1 and 2	Revision 3 8/07/1986
S-C-R200-MFD-0399	Incore Flux Thimble Retraction/Shortening. Salem Generating Station Units 1 and 2	Revision 0 6/09/1986
VS1.RE-IS.RC-0001(Q)	ABB/CE Flux Thimble Thermocouple Examination for Salem Unit #1 (Salem – 400- 019)	Revision 0 7/29/1993
ER-SA-370-1002	Guidelines for Flux Thimble Tube Inspection	Revision 1
Accession Number 9404220015	Evaluation of Supplemental Response to NRC Bulletin No. 88-09, Thimble Tube Thinning in Westinghouse Reactors, Salem Nuclear Generating Stations, Units 1 and 2 (TAC Nos. M88472 and M88473)	4/15/1994

The staff noted that the applicant's Flux Thimble Tube Inspection is classified as a "new" program because in 1993 the applicant discontinued the eddy current testing (ECT) of flux thimble tubes recommended in NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors." The staff reviewed the history of the applicant's earlier Flux Thimble Tube Inspection program, noting that in the early 1980's the applicant experienced a number of failures in its original flux thimble tubes, and in 1988 the applicant implemented flux thimble tube ECT in accordance with its original response to NRC Bulletin 88-09. The staff noted that in 1990 the applicant replaced all of its flux thimble tubes in Unit 1 and in Unit 2 with a new, wear-resistant thimble tube design consisting of an outer pressure boundary tube and a concentric dry guide path inner tube. The staff noted that in a letter dated December 20, 1993, the applicant submitted a supplemental response to NRC Bulletin 88-09 providing the staff with an evaluation of the new thimble tube design and justification for discontinuing its Flux Thimble Tube Inspection program. In a letter dated April 15, 1994, (Accession No: 9404220015) the staff issued a safety evaluation of the applicant's supplemental response to NRC Bulletin 88-09 accepting the applicant's proposal to discontinue the Flux Thimble Tube Inspection program.

During the audit the staff asked the applicant to clarify whether there had been any ECT of flux thimble tubes performed since issuance of the staff's safety evaluation dated April 15, 1994; whether there had been any replacement of flux thimble tubes since that date; and to explain how failure of a flux thimble tube's reactor coolant pressure boundary would be detected, if it should occur. In response to these questions, the applicant stated 1) that there had been no ECT of flux thimble tubes performed since issuance of the safety evaluation; 2) that some flux thimble tubes had been replaced, but not because of reactor coolant pressure boundary failure or failure caused by wear; and 3) that a leak detection system monitors any leakage from flux thimble tubes, and no such leakage had been observed since replacement of the original flux thimble tubes with the improved design.

During the audit of program elements 1-6, the staff found that:

> Elements 1, 2, 3, 4, and 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, and acceptance criteria) of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP; and

> Sufficient information was not available to determine whether element 5 (monitoring and trending) of the LRA AMP is consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether LRA program element 5 is consistent with the corresponding element of the GALL Report AMP, the staff indicated that it would consider issuing an RAI for the following subject:

> In element 5 of the LRA AMP the applicant's program basis document states that because there has been no examinations in several refueling outages due to implementation of the improved flux thimble tube design, an examination will be conducted during the refueling outage prior to entering the period of extended operation to baseline the wall thickness and provide data for wear predictions. In the GALL Report AMP, element 5 states that wall thickness measurements will be trended and wear rates calculated, with examination frequency based on plant-specific wear projections, and that re-baselining of the examination frequency should be justified using plant-specific wear-rate data unless prior plant-specific NRC acceptance for the re-baselining was received. It is not clear to the staff that these statements are consistent because the applicant has no current plant-specific wear rate data, and it is not clear to the staff how the applicant will re-baseline its current condition of flux thimble tube wear.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement, LRA Section A.2.1.25. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report AMP while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.26 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

In the SNGS LRA, the applicant states that AMP "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," is a new program that is consistent with the program elements in GALL Report AMP XI.M26, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components."

The applicant committed, Table A-5 Commitment 26 to implementing this program prior to the period of extended operation as discussed in LRA Appendix A1.26, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," to verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "internal," "surface," and "corrosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.M38	Program Basis Document - Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Revision 3 2009
ANSI N-510-1980	Aging Assessment Field Guide	Revision 0 12/2003
ASME N-1-2008	Testing of Nuclear Air Treatment System	1980
ASME NQA-1-2008	Quality Assurance Requirements for Nuclear Facility Applications	2008
ASME N511-2007	In-Service Testing of Nuclear Air Treatment, Ventilation, and Air-Conditioning Systems	2007
ANSI N45.45.2.6-1978	Qualifications of Inspection, Examination and Testing Personnel for Nuclear Power Plants	1978

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.27 Lubricating Oil Analysis

In the SNGS LRA, the applicant states that AMP B.2.1.27, "Lube Oil Analysis," is an existing program with an exception that is consistent with the program elements in GALL Report AMP XI.M39, "Lubricating Oil Analysis Program." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

In Appendix A Table A.5 of the LRA, in Commitment No. 27, the applicant committed to continuing the existing program into the period of extended operation.

The exception affects LRA program element 3 (parameters monitored or inspected). The GALL Report AMP recommends that the flash point be determined for oil in components that do not have regular oil changes. The applicant states that the determination of flash point in lubricating oil is used to indicate the presence of highly volatile or flammable materials in a relatively nonvolatile or nonflammable material, such as found with fuel contamination in lubricating oil. The existing Lubricating Oil Analysis program includes flash point analysis for the in-service

emergency diesel generator (EDG) lubricating oil (the only potential application for the introduction of highly volatile or flammable materials) and for all new lubricating oil. The applicant further states that for the remaining components in the scope of the program, determination of flash point is not measured.

During its audit, the staff reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "oil," "pitting," "corrosion," "oxidation," "rust," and "leak."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
MA-AA-716-230	Predictive Maintenance Program	80086880-2701
MA-AA-716-230-1001	Oil Analysis Interpretation Guideline	80086880-2702
MA-AA-716-230-1004	Lubricant Sampling Guideline	80086880-2703
MA-AA-716-006, Rev. 5	Control of Lubricants Program	80086880-2704
SM-AA-300-1001, Rev. 4	Procurement Activities and Responsibilities	80086880-2705
Maintenance Items S1100133, S1100134, and S1100135	1A/B/C EDG Lube Oil: Sample for Analysis	80086880-2706
Maintenance Items S2100421, S2100422, and S2100423	2A/B/C EDG Lube Oil: Sample for Analysis	80086880-2707

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the exceptions and proposed enhancements. During the audit, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A2.1.27. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.28 ASME Section XI IWE

In the SNGS LRA, the applicant states that AMP XI.S1, "ASME Section XI, Subsection IWE" is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancements affect LRA program element 1 (scope of program). In Appendix A of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

The first enhancement affects LRA program element 1 (scope of program). This enhancement expands on the existing program element by adding a requirement for inspection of a sample of the inaccessible liner covered by insulation and lagging prior to the period of extended operation and every ten years thereafter. Should unacceptable degradation be found, additional insulation will be removed as necessary to determine the extent of the condition in accordance with the corrective action process.

The second enhancement affects LRA program element 1 (scope of program). This enhancement expands on the existing program element by adding a requirement for visual inspection of 100% of the moisture barrier at the junction between the containment concrete floor and the containment liner. These inspections will be performed in accordance with ASME

Section XI, Subsection IWE program requirements to the extent practical within the limitation of design, geometry and materials of construction of the components. The bottom edge of the stainless steel insulation lagging will be trimmed, if necessary, to perform the moisture barrier inspections. This inspection will be performed prior to the period of extended operation and on a frequency consistent with IWE inspection requirements thereafter. Should unacceptable degradation be found, corrective actions, including extent of condition, will be addressed in accordance with the corrective action process.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "corrosion," "liner plate," and "moisture barrier."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-B.2.1.28, Book 1 of 1	Aging Management Program Results Document, ASME Section XI, Subsection IWE, GALL Program XI.S1	
SH-PBD-AMP-XI.S1, Book 1 of 1	Aging Management Program Basis Document, ASME Section XI, Subsection IWE, GALL Program XI.S1	Revision 2 11/11/2009
Notification 20344017	Unit 1, Walkdown and Inspection in 1995	
Notification 20235636	Unit 2, Walkdown and Inspection in 2005	
DRN 0108-0373-01	Technical Input to Operability Evaluation of Potential Containment Liner Corrosion	Revision 0 10/30/2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

> Elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
> The operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff indicated that it would consider issuing RAIs for the following subjects:

1. A review of the operating experience of the SNGS Unit 1 (PIRS # 950706252-78) in 1995, (Notification # 20344017) in 2007, and Unit 2 (Notification #20235636) in 2005, indicate that borated water has been flowing behind the liner plate which resulted in indications of corrosion of the containment liner plate and seepage of water into moisture barrier. Therefore, the staff plans to issue RAI requesting the applicant to provide detailed future plans for determining corrective actions, including commitments and completion schedules, for addressing steel liner plate corrosion and moisture barrier deterioration.

2. Program element 10 for the SNGS ASME Section XI, Subsection IWE AMP discusses sampling inspections of normally inaccessible areas of steel liner plate located behind the insulation panels around the lower 30 feet of the Unit 1 containment completed in 2009. Similar inspections are scheduled for Unit 2. However, details of the sampling methodology used for the inspection is not described in the LRA and program basis document. Therefore, the staff plans to issue an RAI to applicant to describe the sampling methodology used in 2009, and sampling methodology to be used in future inspections to select the locations for inspecting containment liner plate and moisture barrier behind the insulating panels.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.29 ASME Section XI IWL

In the SNGS LRA, the applicant states that AMP XI.S2, "ASME Section XI, Subsection IWL," is an existing program that is consistent with the program elements in GALL Report AMP XI.S2, "ASME Section XI, Subsection IWL." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective

actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SA-PBD-AMP-B.2.1.29, Book 1 of 1	Aging Management Program Results Document, ASME Section XI, Subsection IWL, GALL Program XI.S2	Revision 2
SA-PBD-AMP-XI.S2, Book 1 of 1	Aging Management Program Basis Document, ASME Section XI, Subsection IWL, GALL Program XI.S2	Revision 2 11/06/2009
S-C-CAN-SEE-1353	Acceptance Criteria for Containment Concrete Defects	Revision 0
Notification 000020234570	Cracks in the Unit 2 concrete containment coating	

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program. During the audit, the staff found that:

> Elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff indicated that it would consider issuing RAIs for the following subjects:

1. Provide the basis for the acceptance criteria in Section 5.4 of S-C-CAN-SEE-1353, Rev. 0, including the reasons for it being significantly less stringent than the ACI 349.3R

requirements. In addition, describe details of corrective actions that the applicant plans to implement remedial actions for using the acceptance criteria described in Section 5.4 of S-C-CAN-SEE-1353, Rev. 0.

2. Provide a description of the extent and maximum width of the cracks observed in SNGS, Units 1 and 2 containments and actions that are planned to mitigate the consequences of chloride ion penetration to the level of the embedded steel reinforcing bars over the period of extended operation. If mitigation actions are not planned, provide an assessment of the consequences of chloride ion penetration to the level of the embedded steel reinforcing bars.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.30 ASME Section XI IWF

In the SNGS LRA, the applicant states that AMP B2.1.30, “ASME Section XI, Subsection IWF,” is an existing program that is consistent with the program elements in GALL Report AMP XI.S3, ASME Section XI, Subsection IWF. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “IN 2009-04,” “constant support,” and “component support.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.S3	Salem Generating Station Units 1 and 2 and Hope Creek Generating Station ASME Section XI, Subsection IWF	Revision 2 11/06/2009
	Salem, Unit 1 Nuclear Generating Station , ISI Third 10-Year Interval Long Term Plan	Revision 2
Notification No. 20257792	Concrete Pedestal Crack – 11CCHX	
Notification No. 20256267	Hanger Spring Setting Out of Tolerance	
Notification No. 20361562	Salem Unit 2 No. 22 Steam Generator Support Pad Cap Screws Were Found Broken	

During the audit of program elements 1-6, the staff found that:

> Elements 1 through 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff indicated that it would consider issuing anRAI for the following subject:

> GALL Program XI.M18, Bolting Integrity, states that GALL Program XI.S3, "ASME Section XI Subsection IWF," manages inspection of safety related bolting. SNGS station document SH-PBD-AMP-XI.M18 states that the Bolting Integrity AMP follows information as delineated in NUREG-1339, published EPRI NP-5769 guidelines, and industry recommendations. EPRI NP-5769, EPRI TR-104213, and NUREG-1339 recommend inspections for stress corrosion cracking (SCC) to prevent or mitigate degradation and failure of structural bolts with actual yield strength of 150,000 pounds per square inch. However, SNGS LRA Section 3.5.2 states that ASTM A490 bolts, with actual yield strength of 150,000 pounds per square inch, have high resistance to SCC due to their ductility and industry and plant specific operating experience have not identified SCC of ASTM A490 bolts as a concern. The staff will request the applicant to explain the basis for the conclusion that ASTM A490 bolts have resistance to SCC due to their ductility.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.31 Appendix J

In the SNGS LRA, the applicant states that AMP B2.1.31, "10 CFR Part 50, Appendix J," is an existing program that is consistent with the program elements in GALL Report AMP XI.S4, "10 CFR Part 50, Appendix J." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "Appendix J," "LLRT," and "ILRT."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PDB-AMP-XI.S4	10 CFR Part 50, Appendix J	Revision 3 12/09/2009
PSEG Document 20185562	Notification Summary of Unsatisfactory LLRT	4/2004
PSEG Document 20116891	Notification Summary of Unsatisfactory LLRT	10/2004
PSEG Document 20118446	Notification Summary of Unsatisfactory LLRT	10/2002
PSEG Document 20096426	Notification Summary of Unsatisfactory LLRT	4/2002

Document	Title	Revision / Date
SAP # 80090367	Salem Generating Station Surveillance and Test Program Audit NOSA-SLM-06-07	9/18/2006 to 9/29/2006
Notification 20298271	Response to Audit NOSA-SLM-06-07	9/25/2006
Order 20302594	Change request to procedure	10/27/2006

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventive action, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, and is sufficient to detect and manage aging effects during the period of extended operation.

During the audit, the staff noted that the data from the most recent 10 CFR 50, Appendix J tests performed in 2008, indicate that cumulative total leakage was 21% and 22% of the allowable technical specification limit at SNGS, Units 1 and 2, respectively. In addition, the cumulative leakage does not show a significant upward trend from the previous test data. In addition, problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.32 Masonry Walls

In the SNGS LRA, the applicant states that AMP B.2.1.32, "Masonry Wall Program," is an existing program with enhancements that is consistent with the program elements in GALL AMP XI.S5, "Masonry Wall Program." To verify this claim of consistency the staff audited the LRA

AMP. This audit report considers program elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience), and the description as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancements affect LRA program element 1 (scope of program), program element 3 (parameters monitored or inspected), and program element 4 (detection of aging effects). In Appendix A of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

The first enhancement affects LRA program element 1 (scope of program). This enhancement expands on the existing program element by adding the following structures and components: fire pump house, masonry wall fire barriers, office buildings (clean and controlled facilities buildings), SBO yard buildings, service building, and turbine building.

The second enhancement affects LRA program element 3 (parameters monitored or inspected). This enhancement expands on the existing program element by adding an examination checklist for masonry wall inspection requirements.

The third enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by specifying an inspection frequency of not greater than five years for the masonry walls.

During its onsite audit, the staff conducted field walk downs, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "concrete," "corrosion," "cracking," and "masonry."

The table below lists the documents that were reviewed by the staff and found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.S5	Masonry Wall Program, GALL PROGRAM XI.S5 – Masonry Wall Program	Revision 2
SH-PBD-AMP-XI.S6	SNGS and HCGS Structures Monitoring Program	Revision 3
ER-AA-310-1009	Condition Monitoring of Structures	Revision 1
NC.DE-TS.ZZ-4302	Analysis and Design of Masonry Walls	Revision 0
A-0-ZZ-SEE-1160	Establishment of Requirement for Monitoring the Condition of Structures	Revision 1
Salem UFSAR Section 3.8.4.5.1	Masonry Walls	Revision 22 5/2006

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

Elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The LRA states that masonry walls have been systematically identified in accordance with the scoping and screening methodology and include those identified in response to IEB 80-11, USI A-46, and those that perform 10 CFR 54.4 intended functions. Actions taken include modifications of some walls, program enhancements, follow-up inspections to substantiate masonry wall analyses and classifications, and the development of procedures for tracking and recording changes to the walls. These actions addressed concerns raised by IEB 80-11 and IN 87-67, namely unanalyzed conditions, improper assumptions, improper classification, and lack of procedural controls. Operating experience is used to enhance plant programs, prevent repeat events, and prevent events that have occurred at other plants from occurring at SNGS. Operating experience from external and internal sources is utilized. SNGS Masonry Wall Program confirms that masonry walls are in good condition and show insignificant aging or degradation. Most recent structural monitoring inspections conducted in August 2008 for SNGS Unit 1 masonry walls indicated that no walls exhibited signs of significant degradation such as efflorescence or cracking. In 2006 corrective action reports were issued to document, evaluate, and repair: degraded masonry wall tie rod (missing nut) on the controlled facilities building wall; and degraded masonry blocks on a seismic radiation shielding masonry wall in the mechanical penetration room.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, is acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.33 Structures Monitoring

In the SNGS LRA, the applicant stated that AMP B2.1.33, "Structures Monitoring Program," is an existing program with enhancements that is consistent with the program elements in GALL AMP XI.S6, "Structures Monitoring Program." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience), and the description as contained in the UFSAR supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancements affect LRA program element 1 (scope of program), program element 3 (parameters monitored/measured), program element 4 (detection of aging effects), and program element 6 (acceptance criteria). In Appendix A of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

Enhancements to LRA program element 1 (scope of program) include the addition of the following structures and components:

> Fire house pump; office buildings (clean and controlled facilities buildings); SBO yard buildings; service building; switchyard; turbine building, transmission towers; yard structures (foundations for fire water and demineralized water tanks, plant vent radiation monitoring enclosures, turbine crane runway extensions, and manholes); building penetrations and pipe encapsulations that perform as flood barriers, pressure boundary, shelter and protection intended functions; pipe whip restraints and jet impingement/spray shields; trench covers and sump liners; masonry walls, including fire barriers; miscellaneous steel (catwalks, vents, louvers, platforms, etc.); vortex suppressor, ice barrier, marine dock bumper (service water intake structure); panels, racks, cabinets, and other enclosures; metal-enclosed bus; component supports including electrical cable trays, electrical conduit, tubing, HVAC ducts, instrument racks, battery racks, and supports for piping and components that are not within the scope of ASME Section XI, Subsection IWF; and duct banks that contain safety-related cables and cables credited for SBO and ATWS.

Enhancements to LRA program element 3 (parameters monitored or inspected) include:

(1) Concrete structures will be observed for reduction in equipment anchor capacity due to local concrete degradation by visual inspections of concrete surfaces around anchors for cracking and spalling.

(2) Clarified that inspections are performed for loss of material due to corrosion and pitting of additional steel components such as embedments, panels and enclosures, doors, siding, metal deck, and anchors.

(3) Require visual inspection of penetration seals, structural seals, and elastomers for degradation (hardening, shrinkage, and loss of strength) that will lead to loss of sealing.

(4) Require following actions related to spent fuel pool liner: perform periodic structural examination of the fuel handling building per ACI 349.3R to ensure structural condition is

in agreement with analysis; monitor telltale leakage and inspect the leak chase system to ensure no blockage; and test water drained from the seismic gap for boron concentration.

(5) Require monitoring of vibration isolators associated with component supports other than those covered by ASME Section XI, Subsection IWF.

(6) Add an examination checklist for masonry wall inspection requirements.

(7) Enhance parameters to be monitored for wooden components to include change in material properties, and loss of material due to insect damage and moisture damage.

Enhancements to LRA program element 4 (detection of aging effects) include:

(1) Specify an inspection frequency of not greater than 5 years for the structures including submerged portions of the service water intake structure.

(2) Require individuals responsible for inspections and assessments for structures to have a Bachelors of Science degree and/or Professional Engineer license and a minimum of four years experience working on building structures.

(3) Perform periodic sampling, testing, and analysis of groundwater chemistry for pH, chlorides, and sulfates on a frequency of five years. Groundwater samples in area of Unit 1 containment structures and Unit 1 auxiliary building will be tested for boron concentration.

(4) Require supplemental inspections of the affected in scope structures within 30 days following an extreme environmental or natural phenomena (large floods, significant earthquakes, hurricanes, and tornadoes).

(5) Perform a chemical analysis of ground or surface water in-leakage when there is significant in-leakage or there is reason to believe that the in-leakage may be damaging concrete elements or reinforcing steel.

Enhancements to LRA program element 6 (acceptance criteria) include additional acceptance criteria as contained in ACI 349.3R-96.

During its onsite audit, the staff conducted field walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "boric acid," "concrete," "corrosion," "cracking," and "spent fuel pool."

The table below lists the documents that were reviewed by the staff and found relevant to the onsite audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.S6	SNGS and HCGS Structures Monitoring Program	Revision 3
SH-PBD-AMP-XI.S5	SNGS and HCGS Masonry Wall Program	Revision 2

Document	Title	Revision / Date
SH-PBD-AMP-XI.S7	SNGS and HCGS RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants	Revision 1
ER-AA-310-1009	Condition Monitoring of Structures	Revision 1
ER-AA-310-1004	Maintenance Rule – Performance Monitoring	Revision 7
ER-AA-310	Implementation of the Maintenance Rule	Revision 7
SA-AMRBD-MEAE	Aging Management Review Basis Document for Materials, Environments, and Aging Effects	
A-0-Z-SEE-1160	Establishment of Requirement for Monitoring the Condition of Structures	Revision 1

The staff conducted its onsite audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the onsite audit, the staff found that:

> Elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> Sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether LRA program element 4 is consistent with the corresponding element of the GALL Report AMP, the staff indicated that it would consider issuing an RAI for the following subject:

> Underground reinforced concrete structures and structures in contact with raw water at SNGS are subject to an aggressive environment with chloride levels up to 15,000 ppm that exceeds the GALL Report threshold limit for chlorides (< 500 ppm). The applicant stated during the onsite audit that inspection of below-grade structures will be performed only when exposed during plant excavations for construction or maintenance activities. In addition, service water intake structure will be monitored to provide a bounding condition and indicator of the likelihood of concrete degradation for inaccessible portions of concrete structures. It is not clear to the staff how the detection of aging effects will be adequately managed by the measures proposed by the applicant. Therefore, the staff plans to request the applicant to provide more details on how aging effects are detected in the inaccessible areas since groundwater intrusion has been observed through seismic expansion joints, concrete construction joints, and expansion and shrinkage cracks in the concrete.

During the onsite audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
> The operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA

AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and mange aging effects during the period of extended operation, the staff will consider issuing RAIs for the following subjects:

In the LRA it was noted that the spent fuel pools at SNGS have experienced leakage of borated water that has migrated through small cracks in the concrete to reach the seismic gap between the containment structure and fuel handling building, and in the Unit 1 Auxiliary Building mechanical penetration room. This leakage is still continuing even after the blockage in the leak chase channels was removed. The current rate of leakage thru leak chase channels is about 100 gallons per day. The staff plans to request additional information from the applicant about the effects of borated water leakage to the concrete or embedded steel reinforcement that is inaccessible for visual inspection.

The LRA states that leakage of borated water has occurred in SNGS Units 1 and 2 reactor cavities during refueling outages, but the leaks have been contained within the containment building. Therefore, the staff plans to request additional from the applicant to describe the plans for remedial actions or repairs to address leakage, and demonstrate that concrete and embedded steel reinforcement potentially exposed to the borated water have not been degraded.

During the field walk down of SNGS, there were instances of efflorescence and evidence of groundwater penetration. At SNGS Unit 1 Auxiliary Building Elevation 64 (below ground water level), there was evidence of water in-leakage through the wall and the area was roped off as an exclusion zone. The applicant was asked about this and informed the staff that the source of the contamination was from in-leakage of groundwater and that the groundwater had picked up the contamination external to the wall. The staff plans to issue an RAI for the applicant to provide a plan to address the leakage of contaminated water through the reinforced concrete wall.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, is acceptable.

Based on this audit the staff:

Verified that with the enhancements most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report; while identifying certain aspects of LRA program element 4 for which additional information or additional evaluation is required before consistency can be determined;

Verified that the operating experience is not sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.34 Regulatory Guide 1.127

In the SNGS LRA, the applicant states that AMP B2.1.33, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," is an existing program with enhancement that is consistent with the program elements in GALL Report AMP XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

Two enhancements affect LRA program element 3 (parameters monitored or inspected). The first enhancement expands on the existing program element by adding monitoring wooden components to include change in material properties and loss of material due to insect damage and moisture damage. The second enhancement expands the scope of elastomers inspection to include inspection for hardening, shrinkage and loss of strength due to weathering and degradation.

The next three enhancements affect LRA program element 4 (detection of aging effects). These enhancements expand on the existing program element by adding (1) requiring that inspection for submerged concrete structural components be performed by dewatering a pump bay or by a diver if the pump bay is not dewatered; (2) specifying an inspection frequency of not greater than five years for in-scope structures including submerged portions of the service water intake structure; and (3) requiring supplemental inspections of the in scope structures within 30 days following extreme environmental or natural phenomena (large floods, significant earthquakes, hurricanes, and tornadoes).

In Appendix A.5 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff conducted a walkdown of the SNGS service water intake structure, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The visual inspection of the exterior portions of the water intake structure was very limited due to weather conditions and significant snow coverage.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date

Document	Title	Revision / Date
SH-PBH-AMP-X1.S7	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Revision 3 12/09/2009
ACI 349.3R	Evaluation of Existing Nuclear Safety-Related Concrete Structures	1996
NRC Regulatory Guide 1.160	Monitoring the Effectiveness of Maintenance at Nuclear Power Plants	Revision 2 3/1997
ER-AA-310-1004	Maintenance Rule	Revision 7
ER-AA-310-1009	Condition Monitoring of Structures	Revision 1
Order 30173727-0001	Inspection Report of the Salem shoreline, including the SWIS, CWIS, cofferdams, and flood dikes	12/04/2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.35 Protective Coatings

In the SNGS LRA, the applicant states that AMP B.2.1.35, “Protective Coating Monitoring and Maintenance Program,” is an existing program that is consistent with the program elements in GALL Report AMP XI.S8, “Protective Coating Monitoring and Maintenance Program.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “cracking,” “corrosion,” “masonry,” “concrete,” “leach,” and “coating.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
CC-SA-6006	Monitoring the Performance of Service Level I Coating Systems for Salem Units 1 and 2	80096880-0601

During the audit of program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that the operating experience provided by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff) and is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP B.2.1.34;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.36 Electrical Cables Not Subject to 10 CFR 50.49 Environment Qualification Requirements

In the SNGS LRA, the applicant states that AMP B.2.1.36, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environment Qualification Requirements," is a new program that is consistent with the program elements in GALL Report AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environment Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in LRA Appendix A section A.5, License Renewal Commitments. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "cable," "degradation," "oxidation," "cracking," and "thermal."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.E1	Aging Management Program Basis Document	Revision 1 7/30/2009
TR-109619	EPRI Guideline for the Management of Adverse Localized Equipment Environments	6/1999
SA-PBD-AMP-B.2.1.36	Salem Generating Station AMP Results Book	

During the audit of program elements 1-6, the staff found that

> Elements 1-6 (scope of program, preventive action, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) were consistent with the corresponding elements of the GALL Report AMP XI.E1; and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff).

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.37 Electrical Cables Used in Instrumentation Circuits

In the SNGS LRA, the applicant states that AMP B2.1.37, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," is a new program that is consistent with the program elements in GALL Report AMP XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits." The applicant committed to implement this program prior to the period of extended operation in LRA Appendix A, Section A.5, License Renewal Commitments. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted independent searches of the applicant's operating experience database using the key words: "cable," "degradation," "oxidation," "cracking," and "thermal."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SA-PBD-AMP-B.2.1.37	Aging Management Program Results Book - Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environment Qualification Requirements Used in Instrumentation Circuits	N/A

Document	Title	Revision / Date
SH-PBD-AMP-XI.E2 Book 1 of 6	Aging Management Program Basis Document - Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environment Qualification Requirements Used in Instrumentation Circuits	Rev. 2, 12/18/2009
SH-PBD-AMP-XI.E2 Book 2 of 6	Aging Management Program Basis Document - Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environment Qualification Requirements Used in Instrumentation Circuits	Rev. 2, 12/18/2009
SH-PBD-AMP-XI.E2 Book 3 of 6	Aging Management Program Basis Document - Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environment Qualification Requirements Used in Instrumentation Circuits	Rev. 2, 12/18/2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the new program.

During the audit, the staff found that

> Elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP; and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff).

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.38 Inaccessible Medium Voltage Cables

In the SNGS LRA, the applicant states that AMP B.2.1.38, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that is consistent with the program elements in GALL Report AMP XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in reference to LRA Appendix A, Table A.5, Commitment Number 38. To

verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "manhole," "duct," "water," "submergence," "cable," "water tree," "electrical tree," "underground," "splice," and, "vault." Further, the staff performed a search of operating experience for the period 2000-November 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff. Databases searched include: Generic Letters, Bulletins, Regulatory Issue Summaries, Licensee Event Reports, Event Notifications, Inspection Findings, and Inspection Reports.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.E3	Inaccessible Medium Voltage cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements GALL Program XI.E3	Revision 1 8/04/2009
LS-AA-115	Operating Experience Procedure	Revision 11 Not dated
SA-PBD-AMP-B.2.1.38	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements GALL Program XI.E3 AMP Results Book	No Revision No. Not dated
000060081894	Work Order Inspection of Manhole SW1 (Completed 6/24/2009)	No Revision No. Not dated
205402	Salem Nuclear Generating Station Plot Plan	Revision 33 4/28/1994
205413	Salem Nuclear Generating Station 500kV Switchyard 13kV Switchyard Conduits	Revision 11 2/03/1995
LS-AA-125	Corrective Action Program (CAP) Procedure	Revision 12 Not dated

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff indicated that it would consider issuing an RAI for the following subject:

> The applicant's operating experience and staff walkdowns and a review of operating experience identified cases of in-scope inaccessible medium voltage cable exposure to significant moisture/cable submergence (i.e., periodic exposure to moisture that lasts more than a few days). Prolonged exposure to significant moisture is inconsistent with GALL AMP XI.E3 including program elements 2 (preventive actions), and 4 (detection of aging effects). Based on operating experience, the applicant's corrective actions with respect to limiting in-scope cables exposure to significant moisture may not be adequate.

The staff also audited the description of the LRA AMP provided in LRA UFSAR Supplement Section A.2.1.38. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAIs for the following subjects:

> LRA UFSAR Supplement Section A.2.1.38 does not include definitions of significant moisture or significant voltage consistent with SRP LR Table 3.6-2 or GALL Report AMP XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The lack of these definitions in combination with the applicant's objective of inspection to keep cables infrequently submerged to minimize exposure to significant moisture may not provide consistency with GALL Report AMP XI.E3.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

Identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.39 Metal Enclosed Bus

In the SNGS LRA, the applicant states that AMP B.2.1.39, "Metal Enclosed Bus," is a new program that is consistent with the program elements in GALL Report AMP XI.E4, "Metal Enclosed Bus." The applicant committed to implementing this program prior to the period of extended operation in LRA Appendix A, Section A.5, License Renewal Commitments. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted a walkdown, interviewed the applicant's staff, observed a demonstration of the thermography camera used by the applicant, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "bus" and "corrosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SH-PBD-AMP-XI.E4	Aging Management Program Basis Document	Revision 1
MA-AA-716-230-1003	General Guidelines for Thermography Inspections	Revision 3
SA-PBD-B.2.1.39	Aging Management Program Results Book	Revision 1

During the license renewal AMP audit walkdown, the staff noticed paint deterioration on the encloser of the 13.8kV metal enclosed bus. The peeling paint does not seem to indicate any corrosion on the metallic surface. The applicant created Condition Report (CR) Number 60041132 to recommend a corrective maintenance be generated to clean and paint the affected areas.

During the audit of program elements 2-6, the staff found that elements 2, 3, 4, 5, and 6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP. The staff noted that sufficient information was not available to determine whether element 1 (scope of program) of the AMP was consistent with the corresponding element of the GALL Report. The staff requested the applicant provide the list of metal enclosed bus in the basis document. The applicant provided staff with an itemized list of the in-scope metal enclosed bus and did include the list of metal enclosed bus in the basis document.

During the audit of program element 10 (operating experience), the staff found that the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff).

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.40 Electrical Cables EQ Requirements

In the SNGS LRA, the applicant states that AMP B.2.1.40, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program with exception(s) that is consistent with the program elements in GALL Report AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in reference to LRA Appendix A, Table A.5, Commitment Number 38. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The exception affects LRA program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 5 (monitoring and trending). The applicant stated that the exception to GALL Report AMP XI.E6 is based on draft interim staff guidance LR-ISG-2007-02 issued for public comment September 7, 2007. Subsequent to the applicant's LRA, the staff issued LR-ISG-2007-02 for staff and public use on December 23, 2009 (74 FR 68287). Therefore, the staff review of LRA AMP B2.1.40 is based on the guidance provided by LR-ISG-2007-02 and GALL Report AMP XI.E3.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "cable,"

"connection," "bolt," "loose," "electrical," "corrosion," "termination," "resistance," and "thermography." Furthermore, the staff performed a search of operating experience for the period 2000-November 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
NUREG 1801	Generic Lessons Learned (GALL) Report Chapter X, "Time-Limited Aging Analysis Evaluation of Aging Management Programs Under 10 CFR 54.21(c)(1)(iii)," AMP X.E1, "Environmental Qualification of Electric Components."	Vol. 2, Revision 1 9/2005
MA-AA-716-230-1003	Thermography Program Guide	Revision 3 Not Dated
LR-ISG-2007-02	Changes to Generic Aging Lessons Learned (GALL) Report Aging Management Program (AMP) XI.E6, "Electrical Cable Connections Not Subject to 10CFR 50.49 Environmental Qualification Requirements"	No Revision No. 12/23/2009
SA-SSBD-E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Sample Basis Document	Revision A Draft Not Dated
SA-PBD-AMP-B.2.1.40	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements - GALL Program XI.E6 - AMP Results Book	No Revision No. Not Dated
6. SH-PBD-AMP-XI.E6	Program Basis Document - Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements – GALL Program XI.E6	Revision 1 7/30/2010
7. LS-AA-125	Corrective Action Program (CAP) Procedure	Revision 12 Not Dated

The staff conducted its audit of LRA program elements 2 (preventive actions) and 6 (acceptance criteria) based without considering aspects of program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 5 (monitoring and trending) of the LRA AMP which are associated with the exceptions. Aspects of these elements not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that elements 2 (preventive actions) and 6 (acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

The staff also noted that draft procedure SA-SSBD-E6 addresses the factors to be considered in sample selection but specifically identified chemical contamination as not applicable. This is inconsistent with Program Basis Document SH-PBD-AMP-XI.E6. During the audit the applicant addressed the inconsistency by revising draft procedure SA-SSBD-E6 to include chemical contamination consistent with GALL Report AMP XI.E6.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff)
>
> The operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff indicated that it would consider issuing an RAI for the following subject:

> The operating experience examples referenced by the applicant in LRA Section B.2.1.40 conclude that the effects of aging and aging mechanisms are being adequately managed. The applicant stated that these examples provide objective evidence that the aging management program, acceptance criterion, and the corrective action process will be effective in resolving problems prior to loss of function. However, it is not clear based on the applicant's discussion that the included examples are representative of operating experience in that the search methodology and criteria are not discussed. (For example, operating databases searched, connection types, time frame, and connection stressors including application, loading and environment).

The staff also audited the description of the LRA AMP provided in the LRA UFSAR Supplement. The staff found this description to be consistent with the description provided in SRP-LR Table 3.6-2 as modified by ISG-ISG-2007-02 and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP as modified by LR-ISG-2007;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B3.1.1, Metal Fatigue of Reactor Coolant Pressure Boundary

In the SNGS LRA, the applicant states that AMP B3.1.1, "Metal Fatigue of Reactor Coolant Pressure Boundary," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary Program." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance

criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 3 (parameters monitored or inspected). This enhancement expands on the existing program element to include additional transients beyond those defined in the Technical Specifications and the UFSAR, and expanding the fatigue monitoring program to encompass other components identified to have fatigue as an analyzed aging effect, which require monitoring.

The second enhancement affects LRA program elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element to use a software program to automatically count transients and calculate cumulative usage on select components.

The third enhancement affects LRA program elements 2, 3, 5, and 6 (preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element to address the effects of the reactor coolant environment on component fatigue life by assessing the impact of the reactor coolant environment on a sample of critical components for the plant identified in NUREG/CR-6260.

In Appendix A, Section A.5, of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "fatigue," "cooling," and "steam generator."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
SA-PBD-AMP-X.M1	Program Basis Document, Metal Fatigue of Reactor Coolant Pressure Boundary	Revision 2 12/4/2009
LTR-PAFM-09-43	Technical Manual for Salem 1 and 2 WESTEMS™ Transient and Fatigue Cycle Monitoring System	No revision 5/2009
WCAP-16963-P	Salem Unit 1 & 2 Transient and Fatigue Cycle Monitoring Program Transient History Evaluation	Revision 2 9/2009
WCAP-16994-P	Environmental Fatigue Evaluation for Salem Unit 1	Revision 0 1/2009
WCAP-16995-P	Environmental Fatigue Evaluation for Salem Unit 2	Revision 0 1/2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

> Elements 1, 2, 3, 4, 5 and 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff)
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

> Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> Verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.3.1.2, Environmental Qualification (EQ) of Electric Components

In the SNGS LRA, the applicant states that AMP B.3.1.2, "Environmental Qualification (EQ) of Electrical Components," is an existing program that is consistent with the program elements in GALL Report AMP X.1E, "Environmental Qualification (EQ) of Electrical Components." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the

applicant's operating experience database using the keywords: "EQ," "qualification," "environmental," "electrical," "cable," component," "connection," and "termination." Furthermore, the staff performed a search of operating experience for the period 2000-November 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff. Databases searched include Generic Letters, Bulletins, Regulatory Issue Summaries, Licensee Event Reports, Event Notifications, Inspection Findings, and Inspection Reports.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
NUREG 1801	Generic Lessons Learned (GALL) Report Chapter X, "Time-Limited Aging Analysis Evaluation of Aging Management Programs Under 10 CFR 54.21(c)(1)(iii)," AMP X.E1, "Environmental Qualification of Electric Components."	Vol. 2 Revision 1 9/2005
Regulatory Guide 1.89	Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants	Revision 1 11/20/2008
SH-PBD-AMP-X.E1	Program Basis Document Environmental Qualification (EQ) of Electrical Components	Revision 1 8/07/2009
NC.DE-PS.ZZ-0002(Q)	Programmatic Standard – Environmental Qualification Program Salem and Hope Creek Generating Stations	Revision 1 6/24/2004
SA-5-ZZ-CEE-1732	Salem Hope Creek Station SAP Maintenance Item Review for EQ Maintenance Requirements Resulting From Order 70013941, Operation 0160	Revision 0 Date: 12/27/2002
LS-AA-115	Operating Experience Procedure	Revision 11 Not Dated
SA-PBD-AMP-B.3.1.2	Environmental Qualification (EQ) of Electric Components GALL Program X.E1 - Amp Results Book	No Revision No. Not Dated
N/A	Quarter - 4th - Year 2009 - Station Salem Salem Station - EQ Program Health Report - Performance Indicators	No Revision No. Not Dated

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

Applicant operating experience reviewed included quarterly EQ program health reports dating from 2006 through 2009, EQ self assessment dated 12/27/2002, basis document operating experience including work orders, corrective actions, EQ program updates and improvements. An independent review of the applicant's operating experience database was also performed by the staff.

The staff also audited the description of the LRA AMP provided in UFSAR Supplement LRA Section A.3.1.2. The staff found, in conjunction with the TLAA UFSAR summary description of LRA Section A.4.7, this description to be consistent with the description provided in the SRP-LR Table 4.4-2 and, therefore, acceptable.

Based on this audit the staff:

Verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

Verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

Verified that the description provided in the UFSAR Supplement is an adequate description of the program.